I n t e g r i t y - S e r v i c e - E x c e l l e n c e

Joint Synthetic Battlespace Industry Forum

February 6, 2004

**Lt Col Emily Andrew
ESC/CXES
(781) 377-6421, DSN 478-6421
Emily.Andrew@hanscom.af.mil**

U.S. AIR FORCE

JSB Industry Forum Agenda
February 6, 2004

- **0900-1130**
  - **Introductions/Administrivia (Lunch, Etc)**
  - **Survey Completion**
  - **JSB Overview**
  - **Discussion Intro - Program Challenges**
- **1130 – Lunch**
- **1200-1500**
  - **Facilitated Discussion**
  - **Wrapup and Summary**

JSB Overview

- **Goals**
- **Background**
- **CONOPs**
- **Development Strategy**
- **Schedule**
- **Funding**
- **Business Model**
- **Summary**

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Readily Available Reuseable

Modeling & Simulation

Capabilities and Services That Allow

1) Improved Warfighting Training & Mission Rehearsal

&

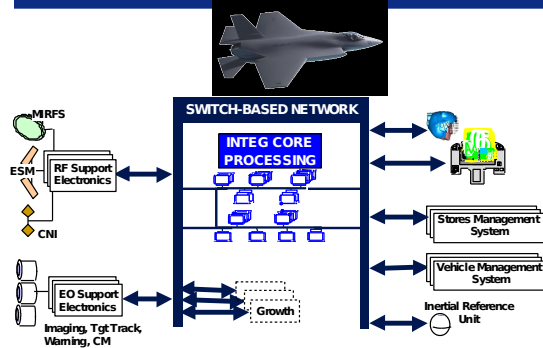**2) More Rapid Development & Delivery of Integrated Warfighting Capabilities**

...ary Customer Focus Initially Distributed Mission Operations (DM... and C2 Trades (C2 Constellation Testbed)

5

Background - The Need
Based on System Complexity

SWITCH-BASED NETWORK

INTEG CORE PROCESSING

MIRFS

ESM

RF Support Electronics

CNI

EO Support Electronics

Imaging, Tgt Track, Warning, CM

Growth

Stores Management System

Vehicle Management System
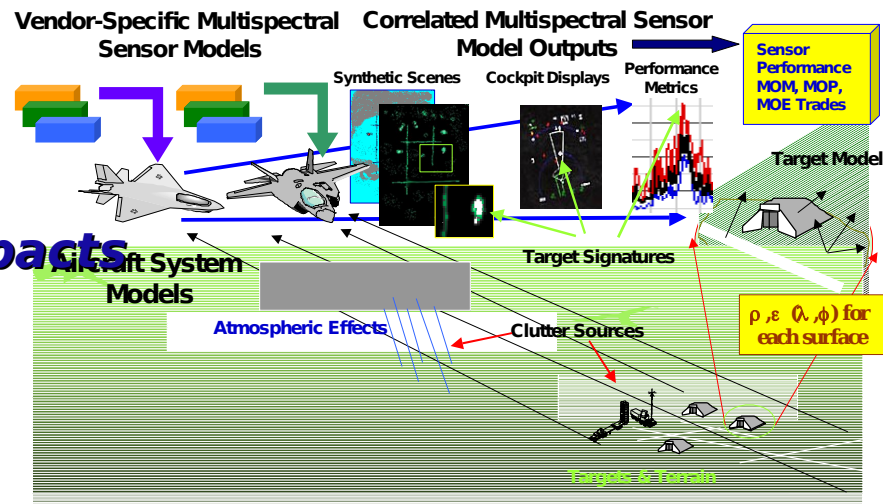
Inertial Reference Unit

Complex System of Systems Interactions

Complex Integrated Avionics Within a Single System

Complex Environmental Impacts
- **Terrain Elevations**
- **Weather**
- **Clutter/Vegetation**

Vendor-Specific Multispectral Sensor Models

Correlated Multispectral Sensor Model Outputs

Synthetic Scenes

Cockpit Displays

Performance Metrics

Sensor Performance MOM, MOP, MOE Trades

Target Model

Aircraft System Models

Target Signatures

Atmospheric Effects

Clutter Sources

$\rho, \varepsilon (\lambda, \phi)$ for each surface

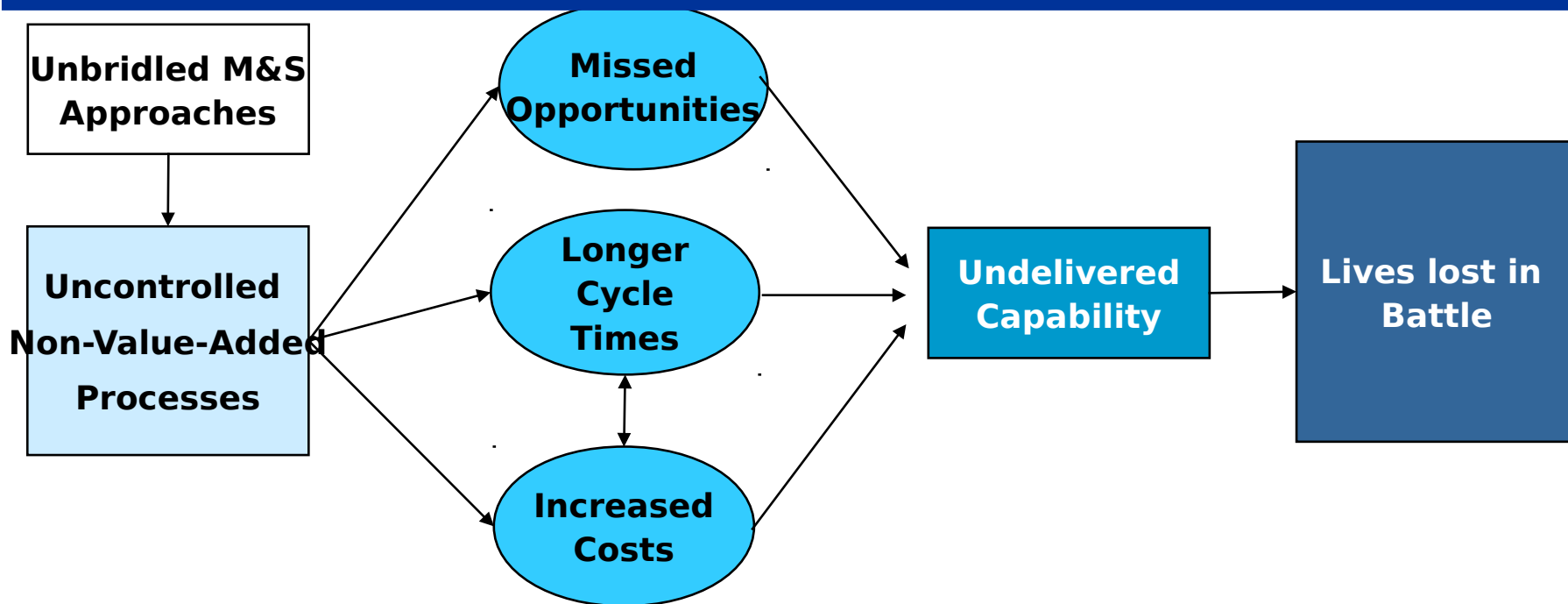Targets & Terrain

Need: Realistic and Accurate Representations!

Background – The Need
Based on Extensive Time to Create Synthetic Battlespaces

PROBLEM: Lack of Simulation Commonality has Created a Cumbersome, Labor-intensive, Time-consuming, Unresponsive Process

Unbridled M&S Approaches

Uncontrolled Non-Value-Added Processes

Missed Opportunities

Longer Cycle Times

Increased Costs

Undelivered Capability

Lives lost in Battle

Need: An Ability to Easily & Rapidly Compose Synthetic Battlespaces! Supports Transformation!

Background – A Solution
Joint Synthetic Battlespace

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Operator
Training, Planning, Rehearsal, . . .

Joint Synthetic Battlespace

ACQUISITION
S&T, R&D, T&E, . . .
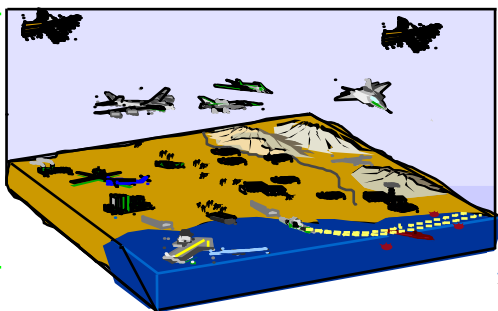
Government Sites,
Contractor Sites, . . .
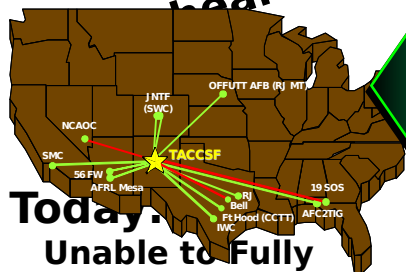
Today:
Unable to Fully Understand Operational Impacts in a Heavily Vegetated Environment --Camouflage, Hyper-spectral, …

Future:
Able to Understand Operational Impacts in all Environments

A Common Architecture That:

-Represents the Natural Environment Realistically

-Verified or Physics-Based Models

-Allows Integration of Legacy Simulations

Today:
Unable to Fully Understand System of Systems and Environmental Impacts

Future:
Simulations Readily Available to Assess System Complexities

Product: Easily Integrate-able and Persistent M&S Components That are Reused for User Executions with High Confidence and Comparable/Repeatable Results

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Background - Senior Leadership Support

- **ACC-AFMC JSB Advocacy Memo – Jul 01**
  - **Establishes Need for Engineering the JSB "up front" to Effectively Field and Operate Task Force Capabilities**
- **C2ISR Summit – Apr 02**
  - **LTG Kenne Publicly Advocated JSB – Establishes JSB Executive Panel**
- **Air Force CORONA Top – May 02**
  - **ACC Assigned as Lead to Define JSB Operational Requirements for the Air Force**
- **C2ISR Round Table – Jul 02**
  - **ACC/AFMC Identified Partnership to Develop JSB CONOPs and Requirements**
- **ACC-AFMC MAJCOM Day – Jul 02**
  - **ACC Asked AFMC to Lead the JSB**
- **Air Force Requirements Oversight Council (AFROC) – 14 Nov 02**
  - **JSB Initial Requirements Document (IRD) Signed 3 Dec by MG Leaf**

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JSB
Capabilities

Acquisition

Acquisition
Operations
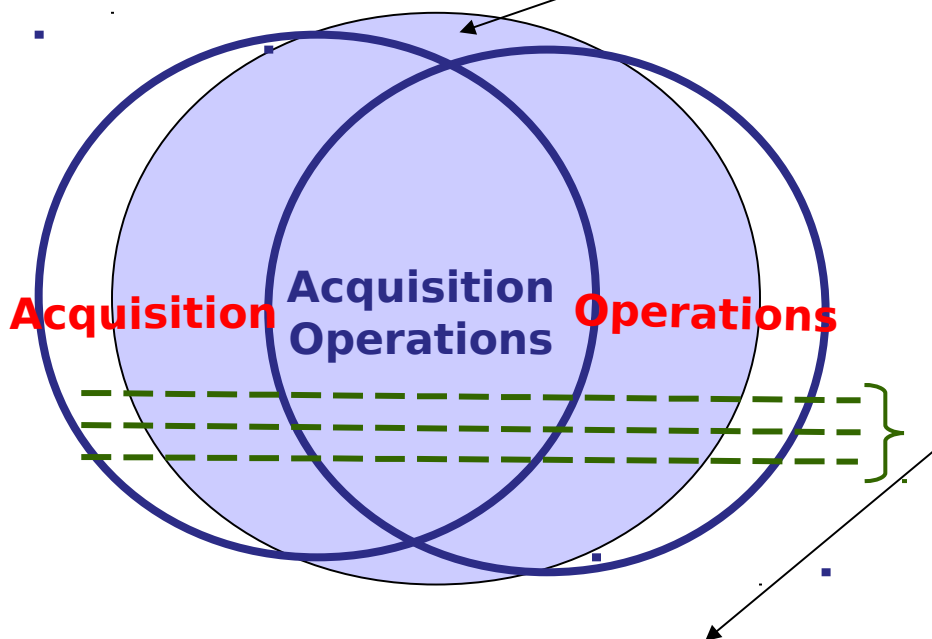
Operations

Common Application Threads
- Analysis
- Test and Evaluation
- Logistics
- Experimentation
- ...

Acquisition:
- **Weapon Systems Procurement**
- **Sustainment**
- **S&T, R&D, T&E**

Operations:
- **Weapons Employment**
- **Warfare Preparation and Execution**
- **Mission Planning & Rehearsal**
- **Operational Training**
- **Battlespace Awareness**

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- **JSB Concept of Operations (CONOPS) – Simulation Based Acquisition (SBA) – Signed by Gen Lyles (AFMC/CC), Nov 01**
- **JSB Initial Requirements Document (IRD) – AFROCC Approved – Signed by MG Leaf, Dec 02**
- **JSB System Requirements Document – Draft – Reviewed by JSB Stakeholders – 15 Jan 04**
- **JSB Risk Assessment – Conducted 21 Jan 04 - 48 Consolidated Risks Identified (Contracting, PM, Technical, Political, CM, etc)**
- **JSB Roadmap – Draft Developed for JSB IPT Review – 20 Feb 04**
- **JSB Integrated Master Schedule (IMS) – Updating Program IMS**
- **JSB WBS – Updating Initial Program Drafts**
- **Initial Request for Information (RFI) to ITS Contractors – 19 Jan 04 4 Responses Received**
- **RFI to Industry – 5 Feb 04**
- **Defining the Business Process/Plan for Ktr/Govt Roles**

Working With Users to Define JSB Since Aug 00 Via JSB Requirements Working Group (JRWG) and Other Forums

Background - Organization

JSB PM
Lt Col Andrew

Admin Asst
Toddy Iozzo

Branch Chief
Acquisition
Bob Kurker

Branch Chief
Operations
Lt Col Szych

Branch Chief
Engineering
Al Zikas

- Lt Herrera
- Barb DiMaio
- Tony Luches – ITSP
- Bos Bozwell – ITSP
- Julie Reed - Tecolote

- Lt Tyler
- Herb Grover – ITSP
- Peter Schnorr

- Dr ElBayoumi
- Lt Brown
- Lt Isasmendi
- Geoff Baum – ITSP
- Ben Baron – ITSP
- Patrice Wolfe – ITSP
- Rochelle Goren – ITSP

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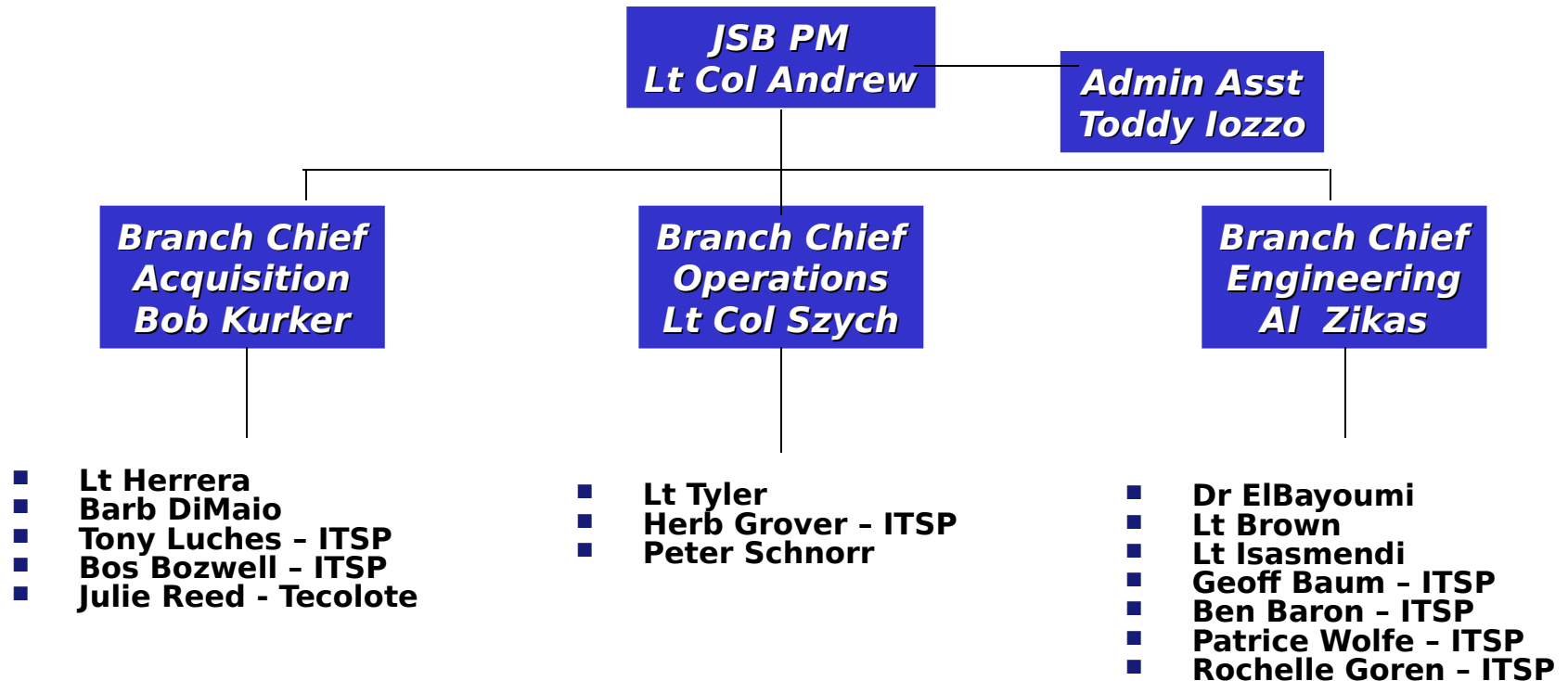
CONOPS – Basic Capabilities
ISR-NEF IRD (Approved 3 Dec 2002)

Primary Capabilities:

- **Realistic Representations of Warfighting Capabilities**
- **Realistic Representations of Natural Environment**
- **Integrated Architecture Framework**
- **Mechanism to Capture and Distribute Information**

n Insight Into Accomplishing IRD Capabilities (FY 04 Increment

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CONOPs
Compose JSB Simulations

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Building Block Components

Specific Uses

Methods to Capture and Distribute Data

Standard Data

Simulated Automated Forces

Acquisition

Training

Radar Data
Phenomenology

Live Weapon Systems

Simulated Fighter

Hardware Component

Manned Simulators

Atmosphere

Terrain

Ocean

Natural Environment
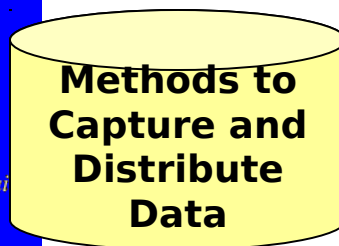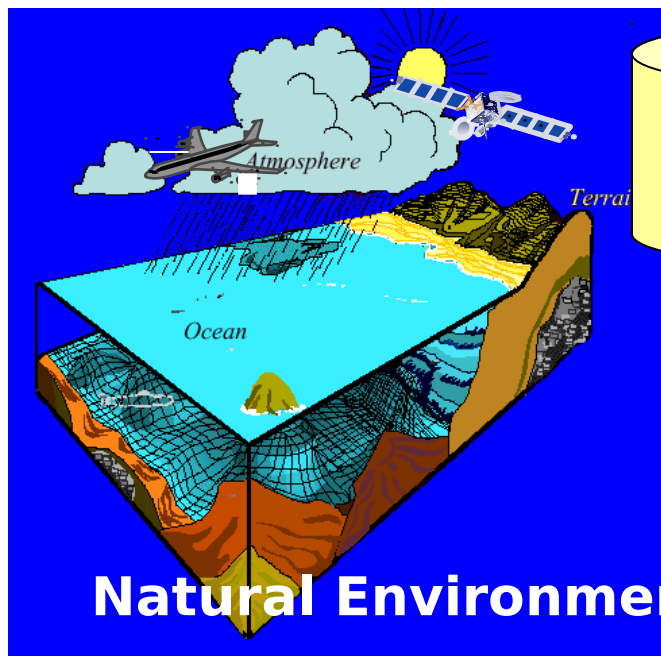
Instantiate
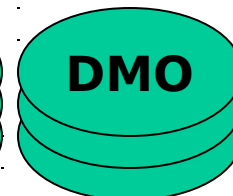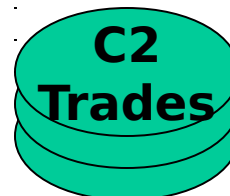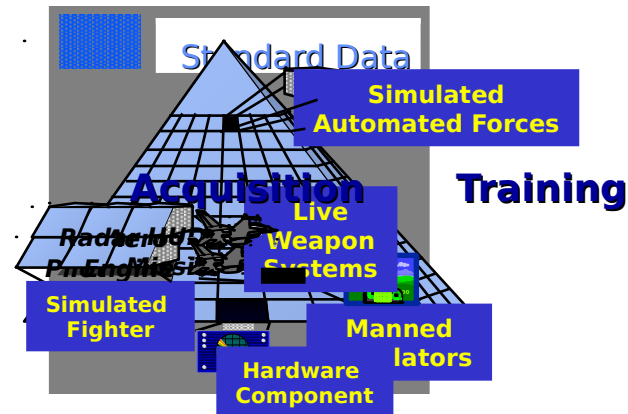
Common Approach to Integration (Standards)

C2 Trades

DMO

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AWACS

JSTARS

E-10

CONUS

FAC-A

WOC/EOC

AOC

AF DCGS

ASOC

TACP

EOC
Intratheater Mobility

CRC

EOC
Intertheater Mobility
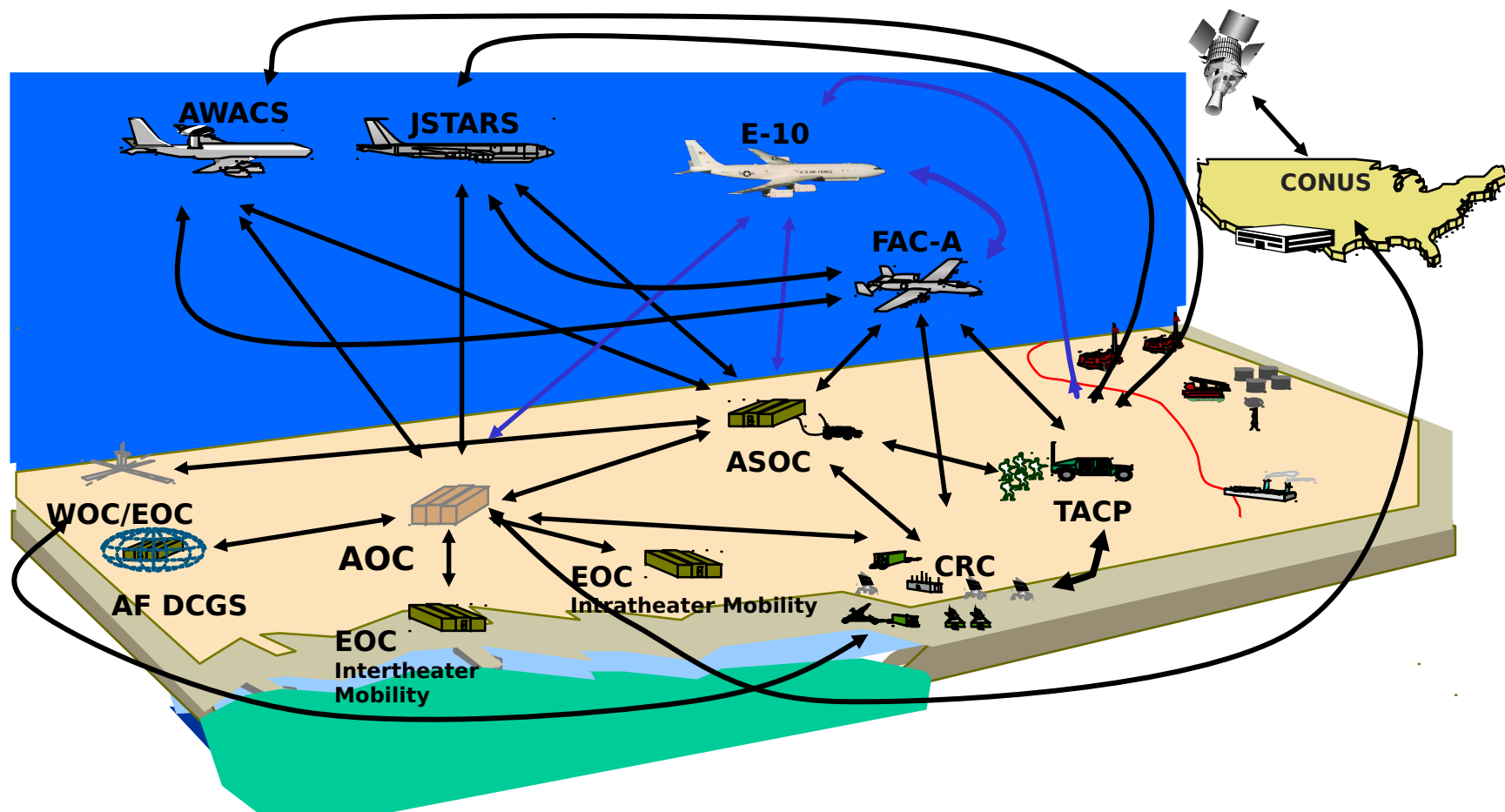
Replicated warfighting capabilities and the relationships
between them … across the Operational Battlespace

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Installation and Maintenance You Can Trust.

AT-HOME SERVICES

Services & Capabilities

JSB Services
- **Already Built Components**
  - **- Single**
  - **- Integrated**
- **User Specified Built Components**
  - **- Virtual Flag**
  - **- C2CTB**
  - **- JEFX**
  - **- ACD&D**
- **Do It Yourself**
- **Customer Service Help**

Catalog of JSB Components
- Warfighting Representations
  - Access to Legacy
  - Space Models
- Natural Environment
  - Atmosphere
  - Weather
  - Terrain
  - CSE
- Framework
  - Composability Tools
- Distributed Data Tools
  - Pre, Post Processing
  - Execution

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Home Improvement Projects Index

JSB Projects
Assembled Components for End-Users (Do it yourself)

Craft a Program that Provides Near Term Deliverable Demonstrate JSB Successes in Support of the Long T JSB Vision

1) **Delivers Products in Support of DMO that are Within Scope of the JSB IRD and AF CONOPS**

2) **Works Long Term Air Force M&S Challenges**

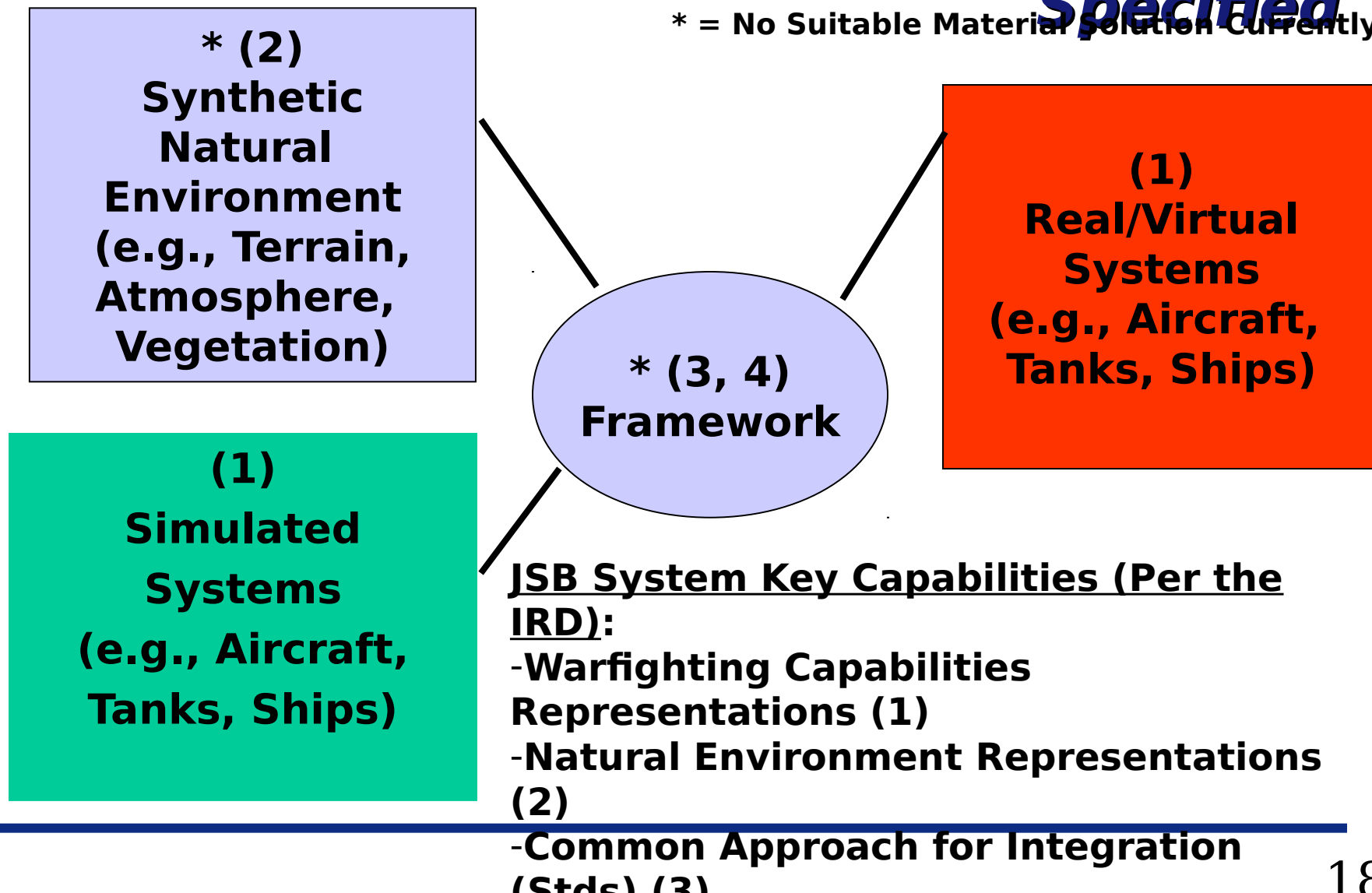3) **Promulgates Air Force M&S Interests in Joint Service M&S Efforts**

JSB-AF IRD (AFROCC Approved – 3 Dec 02), F CONOPS, & AF MSCRs Provide Specific Technical Directi

Development Strategy Initial Reqts Document (IRD) Specified

* = No Suitable Material Solution Currently E...

*** (2)
Synthetic Natural Environment
(e.g., Terrain, Atmosphere, Vegetation)**

**(1)
Real/Virtual Systems
(e.g., Aircraft, Tanks, Ships)**

*** (3, 4)
Framework**

**(1)
Simulated Systems
(e.g., Aircraft, Tanks, Ships)**

JSB System Key Capabilities (Per the IRD):
-**Warfighting Capabilities Representations (1)**
-**Natural Environment Representations (2)**
-**Common Approach for Integration (Stds) (3)**

18

100%

% of total

Current Generation Software (Legacy)

Next Generation Software

0%

Today
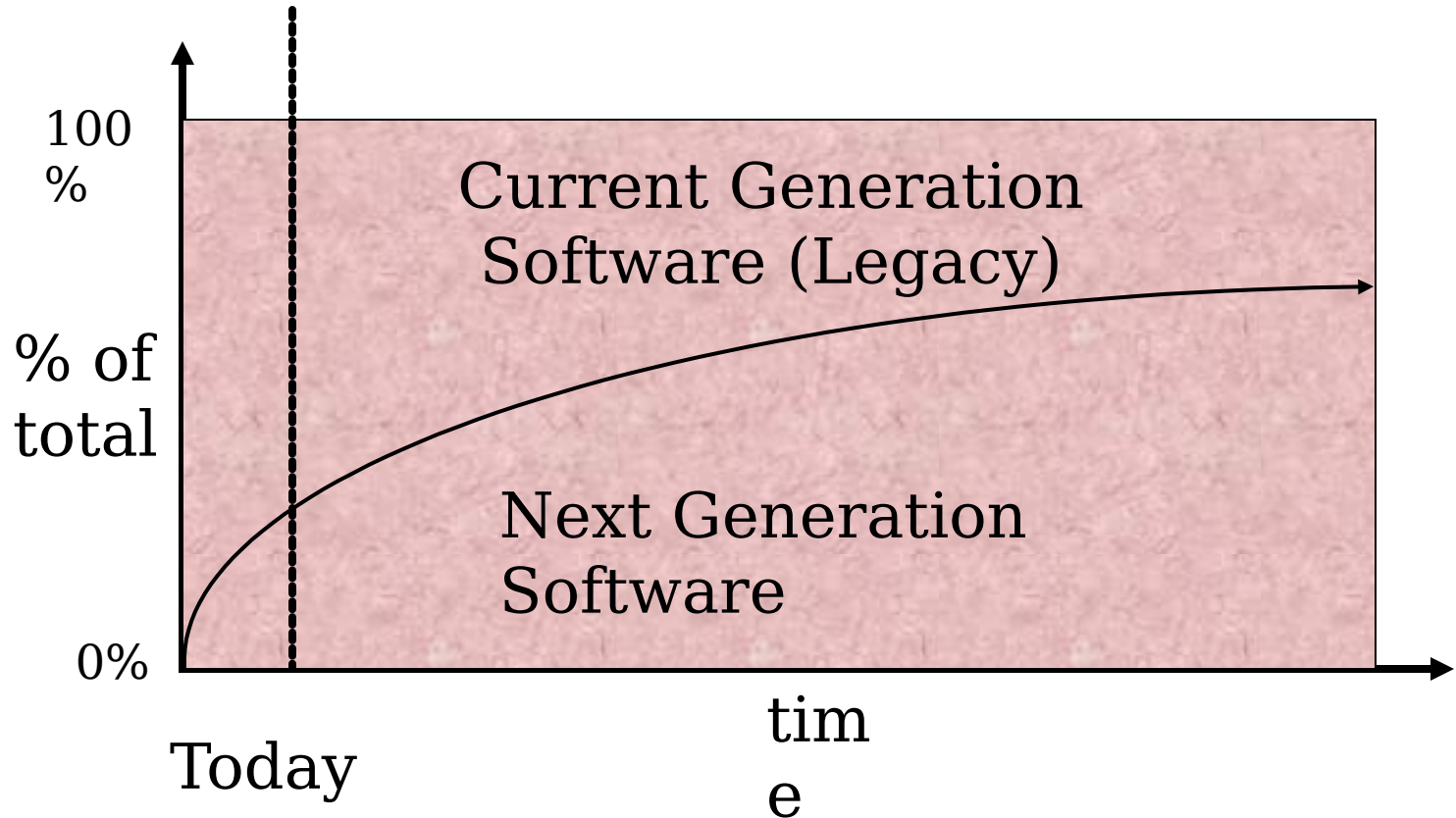
time

Leverage Legacy, Build Non Existent or Lacking Capabilities, Morph Legacy Over Time, Eventually Replace Legacy to Take Full Advantage of JSB Capabilities & Services

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- **Address <u>Long-Term</u> Technical and Management Challenges to Mitigate Risks to Accomplishing the IRD**

- **Provide <u>Near-Term</u> JSB Products Incrementally**
  - **Scenario Generation Server (SGS) for Distributed Mission Ops Center**
  - **Common Synthetic Environment for Natural Environment Using JMASS Components**
  - **Executable Architecture for DMOC Distributed Network**

- **Further Align With the Joint Community to Develop Standards & Architecture**
  - **Provides AF influence**
  - **Leverages AF Technical Leadership in Key M&S Areas**

Leverage Existing Legacy Capabilities Wherever Practical

Long Term Risk Mitigation
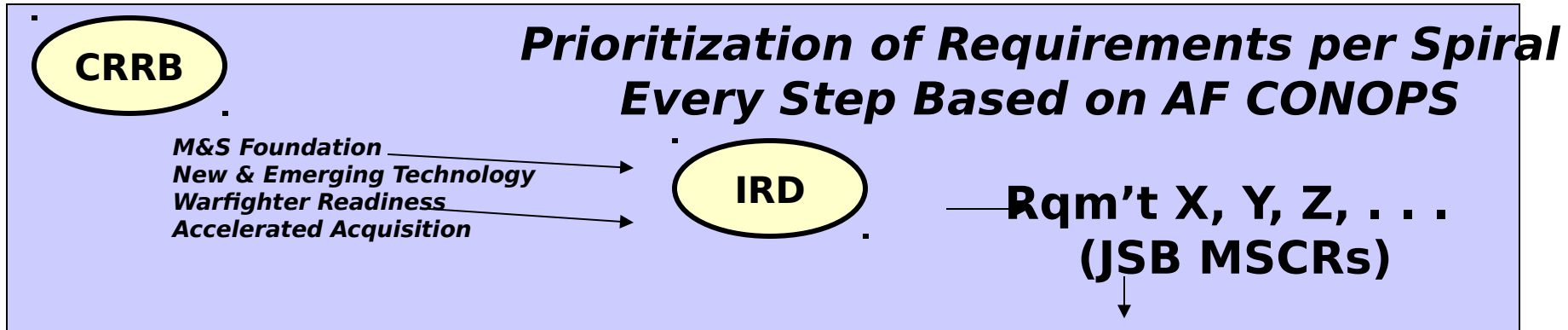## *perational Prototypes to Gain Insight*
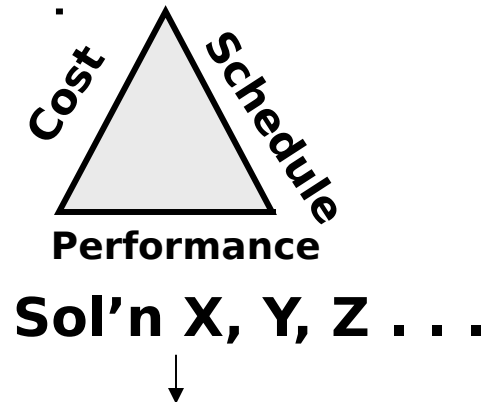
6-12 Month Prototype & Implementation Cycles

JSB IRD

1. Warfighter Reps
- Legacy Model Database D
- Space Modeling Study
- Model Retrofit Prototype

2. Natural Environment
- Common Synthetic Environment Enhancement (OASIS, etc) - Limited
- Leverage DoD Development to date (SEDRIS, etc)
- Additional Study of Environmental modeling

Technology Fly-Off

3. Framework (and standards)
- Prototype 1 – COTS Ontology Based
- Prototype 2 – COTS XML (C2 Like)
- Prototype 3 – Traditional OO Dev with APIs
- Prototype 4 – TBD

4. Data Distribution
- Integrated Data Environment (IDE) Trade Study
- Leverage DoD Developments to Date (HLA Data Logger, etc)
- Investigate developing Scenario Generation Server (SGS)

Test

Identified Set of Solutions for Further Investigation

Interim Operational Capabilities Available for User Events

Strategy – Near Term

CRRB

Prioritization of Requirements per Spiral
Every Step Based on AF CONOPS

M&S Foundation
New & Emerging Technology
Warfighter Readiness
Accelerated Acquisition

IRD

Rqm't X, Y, Z, . . .
(JSB MSCRs)

IRD Screen:

- **Capstone Capabilities**
  - **Realistic Representations of Warfighting Capabilities**
  - **Realistic Representations of Natural Environment**
  - **Integrated Architecture Framework**
  - **Mechanism to Capture and Distribute Information**
- **System-Level Capabilities**
  - **Identify and Select Simulation Components**
  - **Prepare Simulation Environment for Use**
  - **Manage the Configuration**

Cost Schedule

Performance

Sol'n X, Y, Z . . .

JSB Capabilities

MSCRs = M&S Capability Requirements

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- **Use Current Contract Support to Acquire Products Now**
  - **Scenario Generation Server for Simulation "Lay Down"**
  - **PBED such as After Action Reporting**
- **Compete Contract by Jul 04 to Obtain Needed Expertise**
  - **Experts in Information Technology, M&S Solutions, and Warfighting Simulation Experience**
  - **Capable of Identifying Gaps and Providing "Quick Turn" Solutions**
  - **M&S Systems Engineers and Architecture Analysts That Deliver Solutions as an Integrated Capability Based on Open Standards**

BED = Plan, Brief, Execute, & Debrief

- **DMOC Deliverables**
  - **Initiated Meetings with DMOC to Clarify Scope**
  - **Scenario Generation Server Technology Interchange with the DMOC Conducted on 6 Nov 03**
  - **Support Options Being Assessed for Virtual Flag (VF) 04-3 Execution During (29 April – 6 May 04)**
- **Joint Program Support**
  - **JFCOM is Primary Focus (i.e., JNTC/RD3, DCEE)**
  - **Getting Involved Early to Lead Air Force Interests**
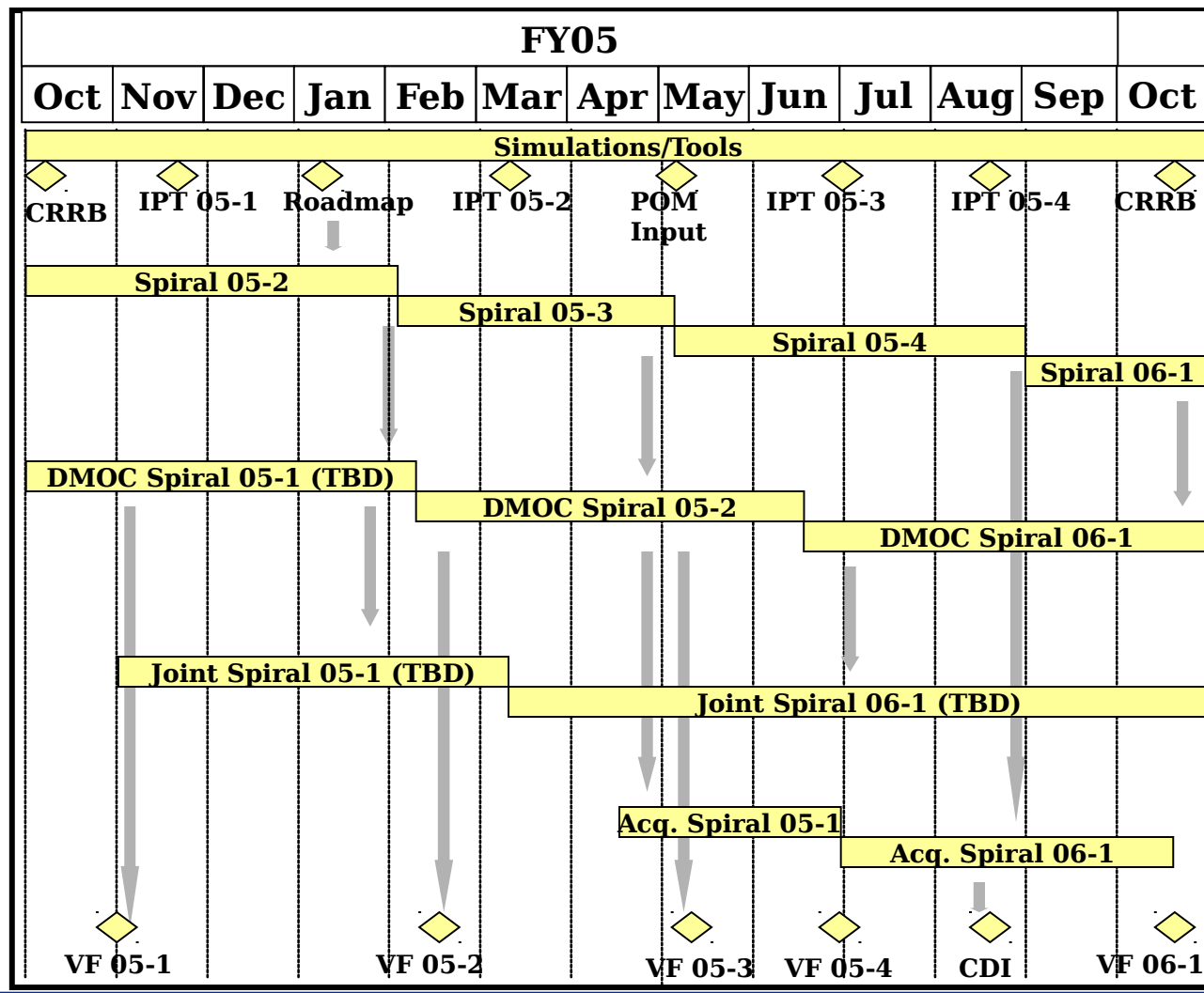 - **Assessing Synergistic Efforts (e.g., SGS and JIDPS)**

JSB Schedule - FY04

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	FY03			FY04												
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct

Acquisition
  Major Milestones — ◆ AFROCC, ◇ PMD, ◇ IPT 04-1, ◇ IPT 04-2, ◇ IPT 04-3

  Contracts — Millennia Lite Contract- Systems Engineering
    ◆ ICD (Draft), ◇ SRD, ◇ Roadmap, ◇ IMS/IPB, ◇ Provide Roadmap
    Info. Solutions

Near Term Products
  Automated Scenario Gen — Scenario Generation Server (SGS)
    (MSCR45) — ◆ Demo, ◇ Accept Test, ◇ SGS Complete

  AFRL SBIR Arch Model — Develop Arch View
    (DMOC Network Connectivity) — ◇ Demo
    (MSCR50)

  Natural Environment Rep — JSB-MATREX RF Component
    (JSB IRD) — JMASS/JMOOSE, ◆ I/ITSEC, ◇ Final Demo, ◇ Technology Deliverable
    Spiral 1 ◆, Spiral 2 ◆, ◆ Spiral 3(JSB Baseline)

  Integration Framework — Digital Harbor
    (JSB IRD) — ◆ Demo

  Warfighting Representation — Spiral 04-1 – AWSIM, CEM
    (JSB IRD) — ◆ SMAT, TBMCS Decision, ◇ Demo

Proposed Near Term Products — Product Support to DMOC
    Assess Feasibility
  Databases (MSCR42) — Design, Code/COTS Select,Test

  Red & Blue Air (MSCR46) — ◆ VF 04-2, ◇ VF 04-3, ◇ VF 04-4, ◇ VF 04-5

  Standards & Arch (MSCR51)

Joint Service Efforts Italicized
  PBED (MSCR47)
  ◆ **Indicates Completed**

Notes : Schedule Executable at $5.0M Funding Level

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JSB Notional Schedule - FY05

Requirements
- JSB Foundations IPT (CRRB)

Foundation Blocks
- Integration Framework (I/F)
- Warfighting Reps (WR)
- Data
- Natural Environment (NE)

DMOC
- I/F Upgrades
- Model Enhancements
- Correlated Database

Joint Services
- RD3 Upgrades
- Scenario Generation

Acquisition
- Space Based Radar

Events
DMOC (VF's), JFCOM (JNTC/DCEE), Center for Domain Integration (CDI)

Post VF 05-1 Dates are TBD

FY05													
Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct

Simulations/Tools

CRRB · IPT 05-1 · Roadmap · IPT 05-2 · POM Input · IPT 05-3 · IPT 05-4 · CRRB

Spiral 05-2
Spiral 05-3
Spiral 05-4
Spiral 06-1

DMOC Spiral 05-1 (TBD)
DMOC Spiral 05-2
DMOC Spiral 06-1

Joint Spiral 05-1 (TBD)
Joint Spiral 06-1 (TBD)

Acq. Spiral 05-1
Acq. Spiral 06-1

VF 05-1 · VF 05-2 · VF 05-3 · VF 05-4 · CDI · VF 06-1

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- **Contract Value Range - $50M to $98M**
- **Approximately 2/3 Developmental and 1/3 is Operations and Maintenance Support**
- **No Procurement Funds Currently Budgeted**

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- **Prime Contractor Conducts Assessments to Recommend Best COTS/GOTS to Meet System Capability Requirements**

- **Government Reviews/Approves Implementation approach**

- **Prime Contractor Acquires Products, Integrates, and Demonstrates**

- **Requirements for Next Spiral Defined**

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- **JSB is:**
  - **Focusing Resources to Provide Near Term and Meaningful Capabilities (e.g., SGS for DMO)**
  - **Mitigating Risks to Reach the Long Term Vision**

Readily Available

Reuseable

Modeling & Simulation

Capabilities and Services

JSB is Engaged in Laying a Corporate Foundation for A Robust Air Force Modeling & Simulation Capability

Discussion

Challenging Questions

- **What Type of Contract to Use – FFP, CPFF, CPIF . . . ?**

- **How Should the Contract be Structured to Allow for Rapid Acquisition of Products?**

- **How Should We Incentivize the Contractor – Award Fee?**

- **What Do You View to be the Biggest Challenge and Risk and Why?**

- **What Recommendations for Mitigating Challenges?**

- **What Should be the Contractor Vice Govt Role?**

- **How Should the JSB Initially be Implemented – e.g., I/F First With Some Model Integration?**

- **How to Get Contractors to Share Data, Modify Models to Integrate with JSB?**

Challenging Questions, Cont'd

- **What Kinds of Arrangements Are Needed for Cooperation by Contractors/Government Organizations to Support Modifications to Their Developments to Integrate With JSB?**

- **How Can the Govt Prevent Parochial Solutions?**

- **How do We Prevent Another Major Simulation Acquisition Failure (e.g., JSIMS)? What Makes us Think we Can Succeed Where Others Have Failed?**

- **How do We Scope JSB so it Doesn't Appear to Be Everything to Everyone? Start with DMO and Expand from There?**

- **What is JSB to You? What Should it Be?**

- **Are any of you doing any other work for ESC that could have a potential OCI issue w/JSB?**

- **Other Questions/Challenges That Come to Mind . . .**

Risk Assessment

Risk	Mitigation Plan
1. Business Model Not Well Understood	Document Plan and Promulgate; Engage Users and Contributors
2. Lack of AF Program Office Cooperation	Promote TIMs, MOAs, and/or MOUs with Contributor SPOs
3. Limited Integration/Test Access to Training Systems	Initiate ID of Potential Scarce M&S Resources; Negotiate Use/Schedule of Resources; Track Lessons Learned for Access
4. Focus/Limiting Resources to Near-Term M&S	Use JSB Roadmap to Chart the Path; Use AF M&S CRRB Prioritization Process
5. Fail to Address Viable Approach to Security, e.g., MLS	Align JSB with Related Programs Resourcing the Same Problem; Examine Commercial Practices

Risk Assessment

Risk	Mitigation Plan
6. Lack Viable Approach for Composability	PO & Prime Keep Abreast of Initiatives; Promote/Sponsor Composability TIM/Exchanges
7. JSB Objectives not Complement Other AF/Joint M&S Initiatives	Continue Dialogue/Cooperation; Encourage JSB IPT Participation; Focus on Communication and Inclusion in the Process
8. Single Product Solution – Narrow Focus	Roadmap and Architecture tied to AF M&S Foundation; Address Broad Set of MSCRs
9. Roadmap not Driven to Product Development	Interim Deliveries – Feedback and Course Correction; Realistic Schedule Tied to User Needs

10 risks tied for 10th risk

Wrapup Summary

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- **Answers to Questions Will be Drafted and Posted on HERBB**

- **Planning Next Industry Day in March Timeframe**

- **Any Questions Should be Emailed to Denise.Herrera@Hanscom.af.mil to Obtain Answers/Responses**

Backups

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Simulations/Tools

CSE – Common Synthetic Environment

I/F – Integration Framework

JIDPS - Joint Integrated Database Preparation System

JMOOSE – JMASS Modular Object Oriented Simulation Environment

NGTS – Next Generation Threat System

PBED – Plan, Brief, Execute, Debrief

SGS – Scenario Generation Server

Facilities

DMOC – DMO Center

Documents

ICD – Initial Capabilities Document

IRD – Initial Requirements Document

MSCR – M&S Capability Requirements

PMD – Program Management Directive

SRD – System Requirements Document

Conferences

I/ITSEC - Interservice/Industry Training, Simulation, and Education Conference

Programs

C2CTB - C2 Constellation Testbed

CDI - Center for Domain Integration

DCEE - Distributed Continuous Experimentation Environment

DMO – Distributed Mission Operations

JMASS – Joint Modeling and Simulation System

JNTC – Joint National Training Capability

JSB-AF – Joint Synthetic Battlespace – Air Force

RD3 – Rapid Distributed Database Development

SBIR – Small Business Innovation Research

VF – Virtual Flag

Organizations

AFROCC – Air Force Requirements for Operational Capabilities Council

CRRB – Capability Requirements Review Board

DMSO – Defense Modeling and Simulation Office

JFCOM – Joint Forces Command

Composability
- Open architecture
- Minimize coding effort
- Minimize integration time
- Minimize testing time
- Minimize V&V effort

Validity
- Validated for user's purpose
- Verified components
- Defined development process
- Minimize new VV&A effort

Commonality
- Natural environment
- Terrain
- Weather
- Friendly & Opposing forces
- Simulation framework and services

Metrics for Measuring Success

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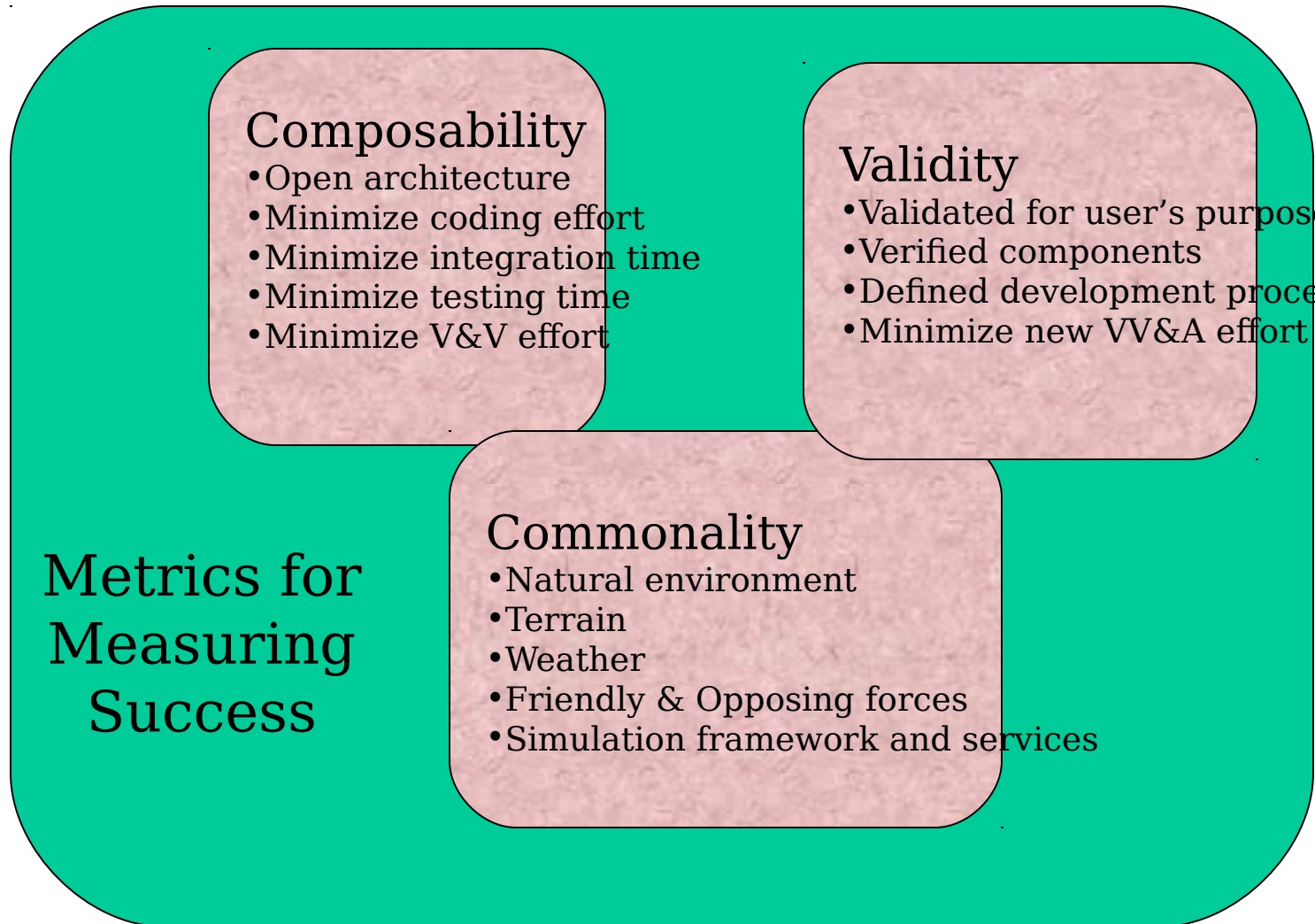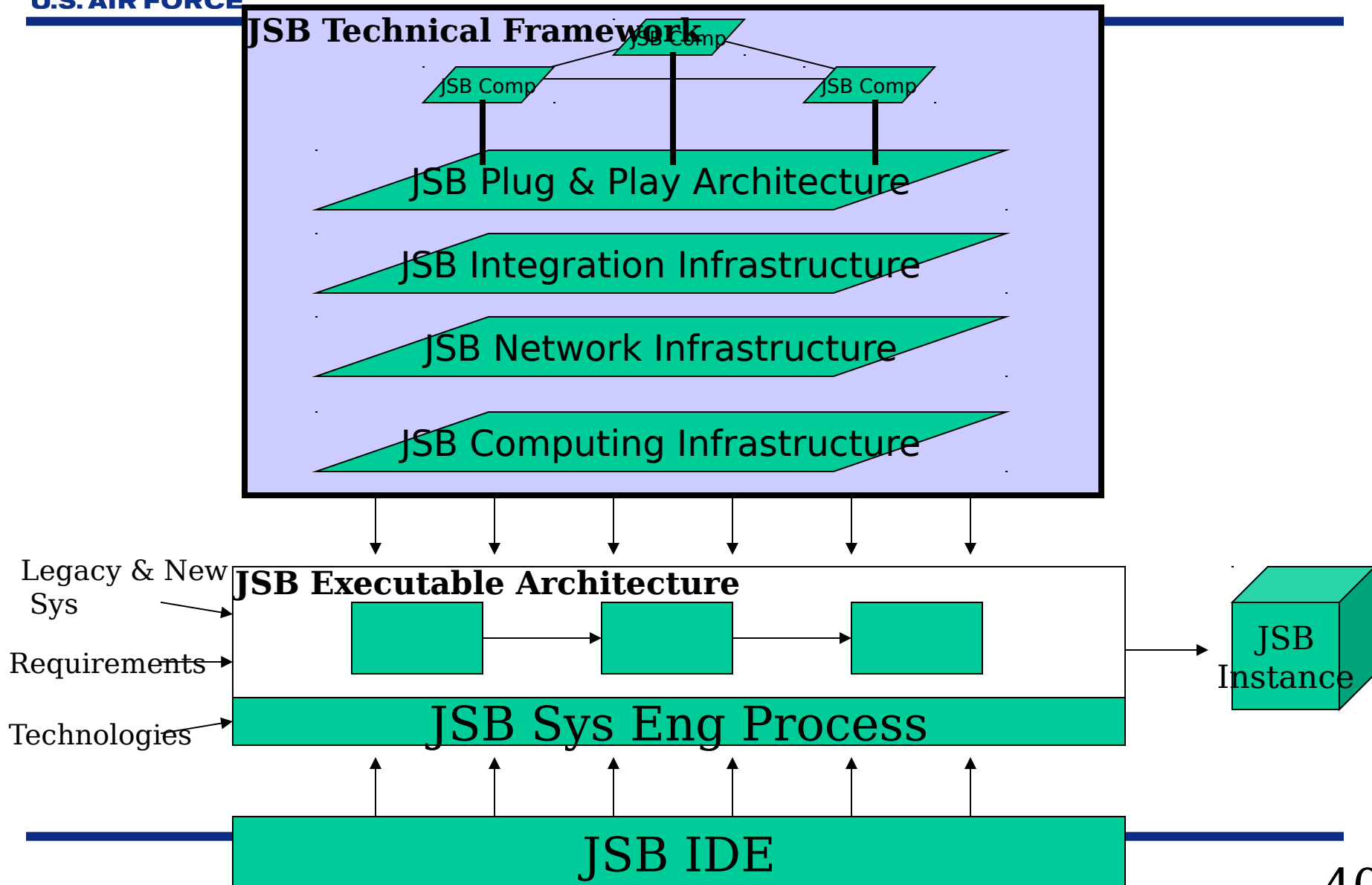
Approach - Technical Framework Relationship to IRD

- Components
- Plug & Play Architecture
- Integration Infrastructure
- Networking
- Computing
- Executable Architecture
- Integrated Digital Environment

Warfighting & Environment Rep's

Common Approach to Integrate

Common Approach to Integrate

Derived – Distributed Application

Derived - Performance

Derived - Engineering

Data Collection/Distribution

FOM = SOM1 ∪ SOM2

SOM1
From SIM1

SOM2
From SIM2

- **Maximizes common FOM**
  - **Standardize JSB common FOM**
- **Minimizes modification of Simulations**
  - **Assessing Ontology Based Integration**

Mini Tutorial: FOM/SOM:
-FOM/SOM – Federation/Simulation Object
-Provides the Interface Spec
-Allows for Publish & Subscribe of Model O

A PIIE-like Function Captures Common Relationships Where FOM = SOM1 ∩ SOM2

RTI Interf

RTI Interf

RTI Interf

Central

PIIE

JSB ontology

JSB PIIE

JSB PIIE

JSB PIIE

RMI

RTI

Path for Common FOM

JSB ontology path

POS

Army SIM

Lat
Lon
Height

AF SIM

Lat
Lon
Alt

Lat
Lon

Navy SIM
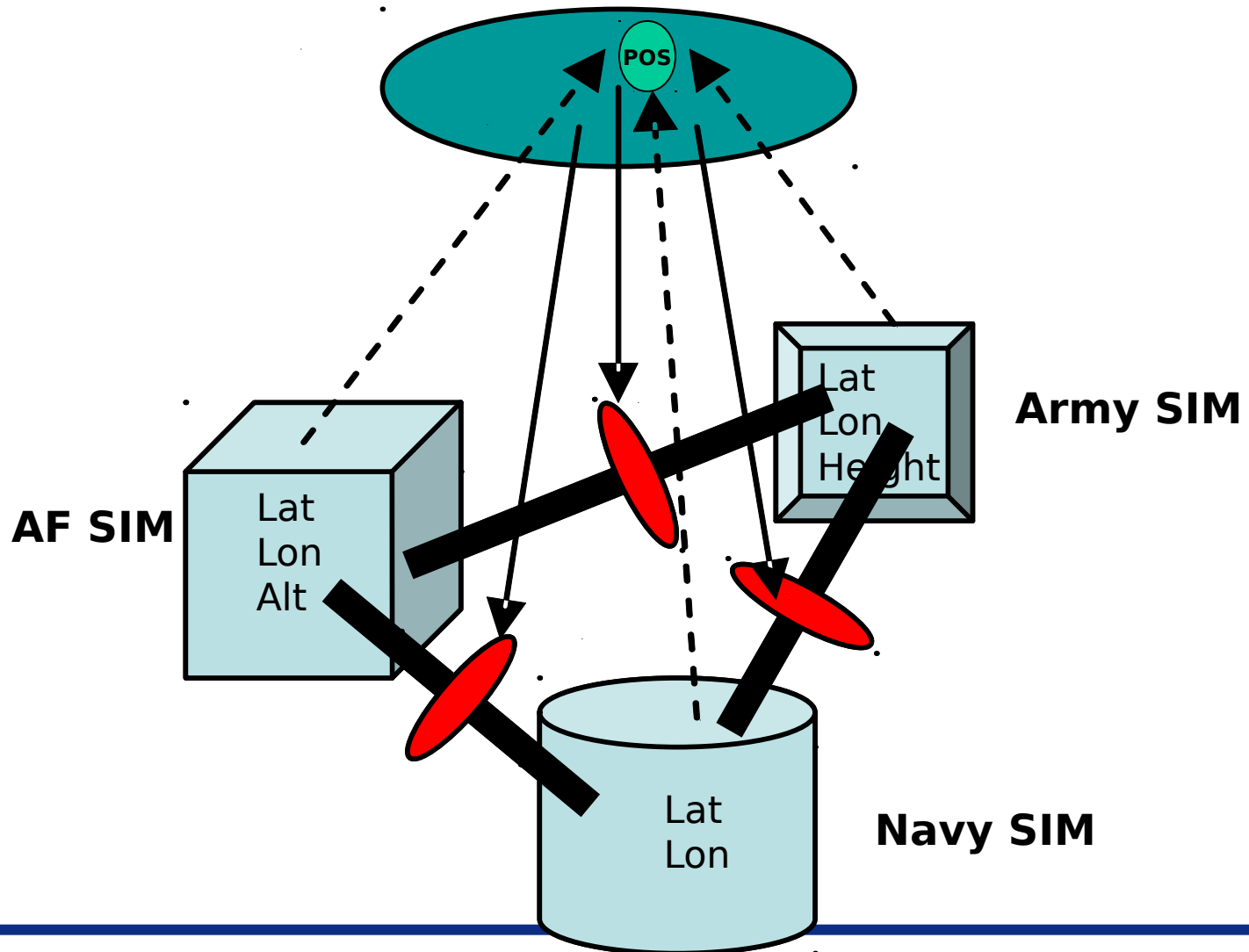
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Tracks & Image
- *Det, Rec, Id with Prob Vec*
- *Processing Latency*

Functions of Common SE Server
- Compute accumulated
  ExCo for EO/IR
  AtFa for RF
  following LOS
- LOS is locally computed.

Environment Server

Sensor

Attenuation
- *Accumulated ExCo for EO/IR*
- *Accumulated AtFa for RF*

Background
- *EO: Contrast*
- *IR: Temp Contrast*
- *RF: σ_o Vicinity, Wide*

Ground Truth
- *Sensor (Pos, Ori, Type)*

Area of Interest

Common SE Sensor Server
- *Terrain with attributes*
- *Features*

Environment Data
- *Weather*
- *EO/IR: Extinction Coefficient (ExCo*
- *RF: Atmospheric Attenuation Factor*

Resolution
- *Spatial, Temporal, Frequency*

Algorithms

Ground Truth
- *Sensor Platform*
- *Target*

Platform

Terrain

Weather (Hum, Temp, Win
Extinction Coefficient

EO	ExCo
IR	ExCo
X	AtFa
L	AtFa

CSE for At-aperture EO/IR/RF Signatures

Attenuated
refracted RF signal

(MTI, SAR & ELINT)

Attenuated,
refracted
directional
EO/IR passband
radiance
(LANTIRN &
EO)

Full, Hi-Res Spectral
Solar/Lunar/Star/Sky/Manmade
Irradiances

Direct Reflected Passband Irradiance

3D Gridded Atmosphere

Scattered & Attenuated Direct &
Diffuse Spectral Irradiance &
Atmospheric Emission

$R_{surf,}$

EO/IR/RF Signature Synthesis

- Material Systems assigned to DB&Target Objects
- Spectral BRDF directional radiance
- 1D Transient Thermal Model,
(Diurnal cycle, solar loading, conduction, convection, radiative cooling, dynamic vehicle states)

T_{air}
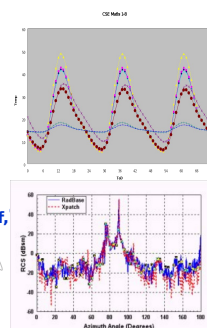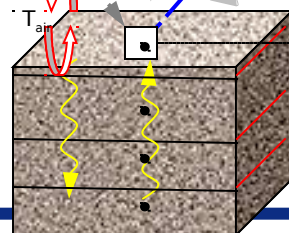
T_{surf}
$R_{surf}(az,el,\lambda)$
$\sigma(az,el,f)$ or
$\sigma_0(az,el,f)$ or
Emitter
Power
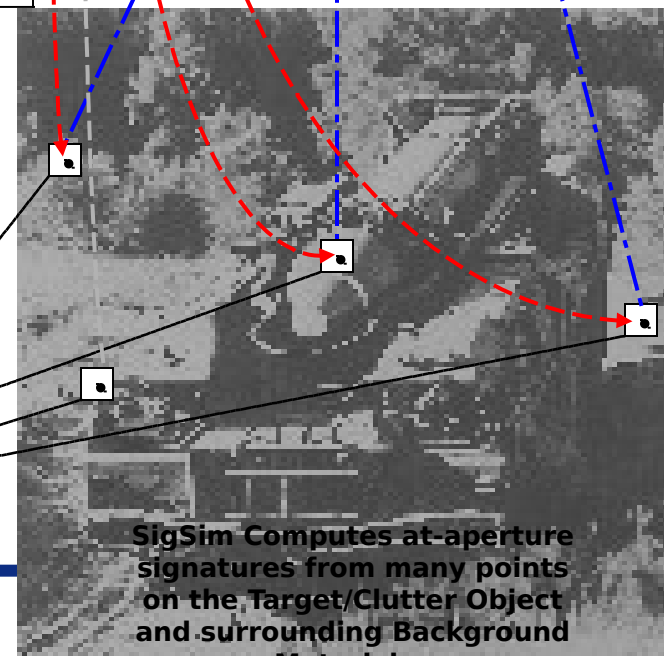
SigSim Computes at-aperture
signatures from many points
on the Target/Clutter Object
and surrounding Background

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"197 Pieces"

"The Idea Book included with this set will bring hours of fun, with detailed step by step instructions for 10 models."

**JSB Software Components
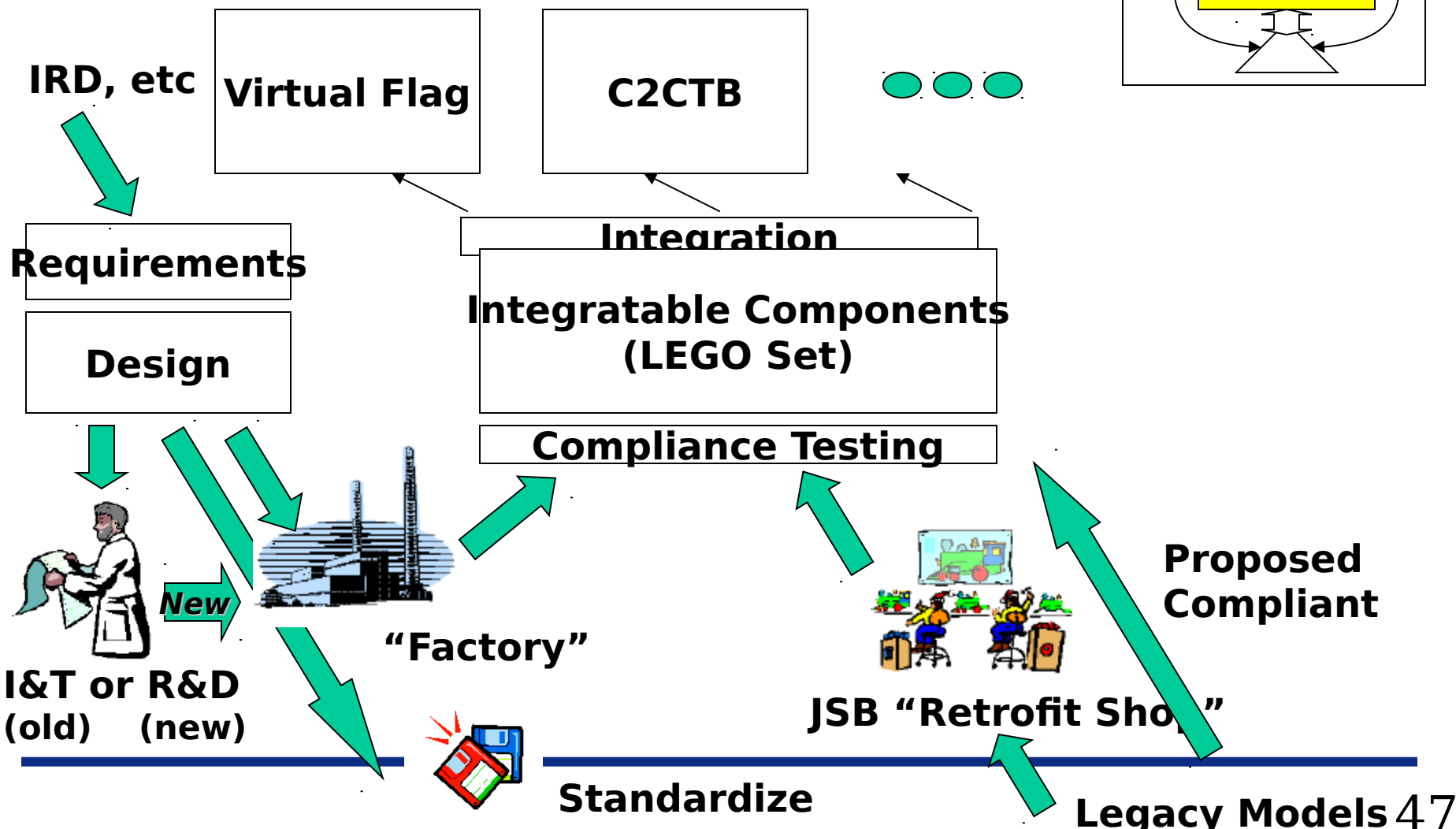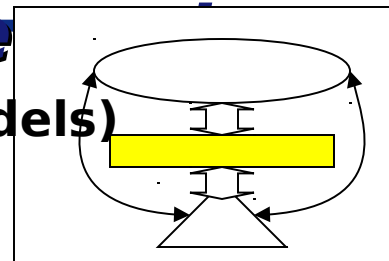(CSE, Scenario Generator, etc)**

**JSB Events or Instances
(Virtual Flag, C2CTB, etc)**

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JSB "Events" or Instances (LEGO Models)

IRD, etc

Virtual Flag

C2CTB

Requirements

Design

Integration

**Integratable Components
(LEGO Set)**

Compliance Testing

I&T or R&D
(old)   (new)

New

"Factory"

JSB "Retrofit Sho..."

**Proposed
Compliant**

Standardize

Legacy Models 47

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Strategy:

- **Taxonomy Defines What Need to Acquire**
- **Want Minimal Capability to Depict Operational Battlespace (JMASS Lesson Learned)**
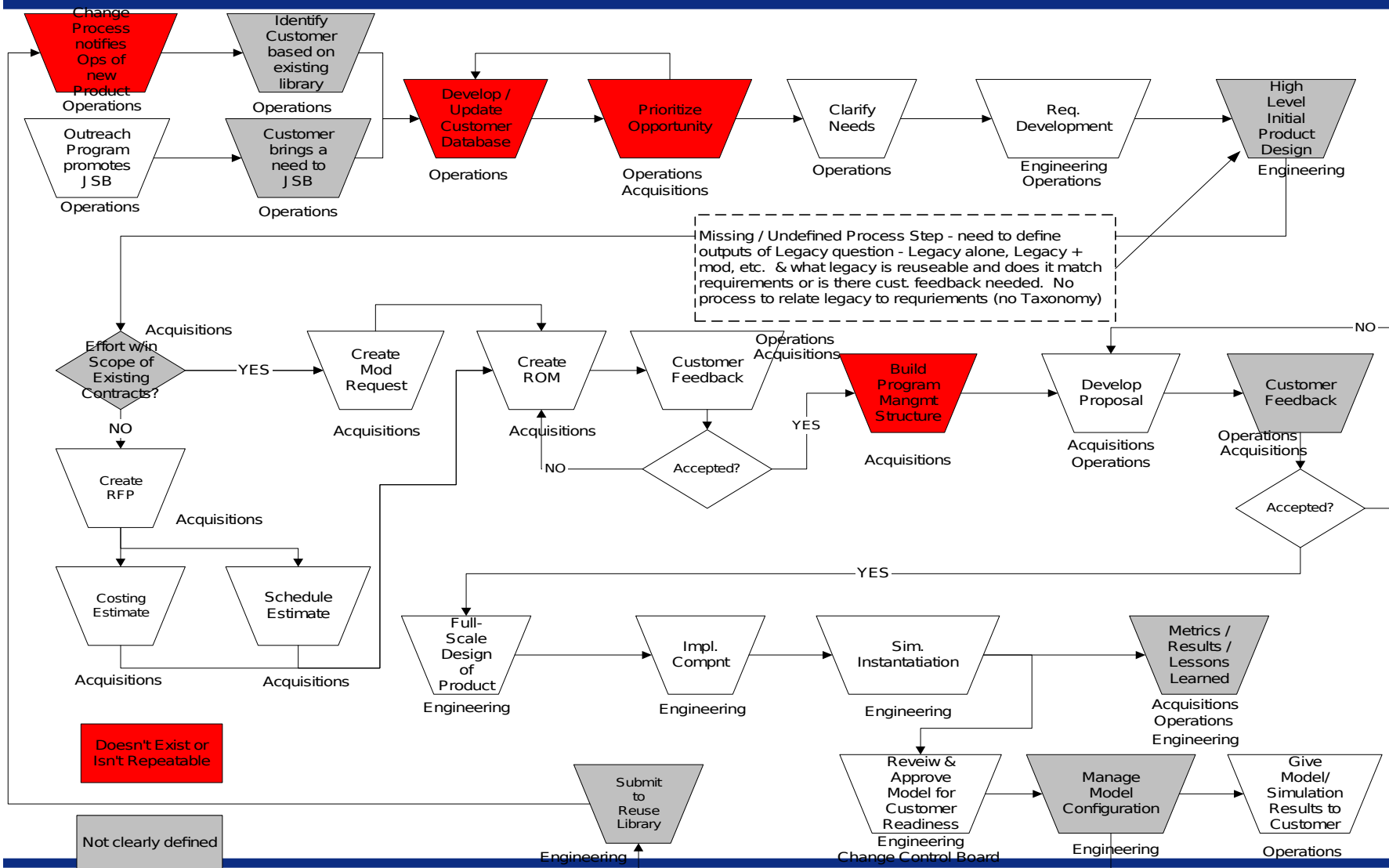- **Expand Capability to Support Unique User Needs**
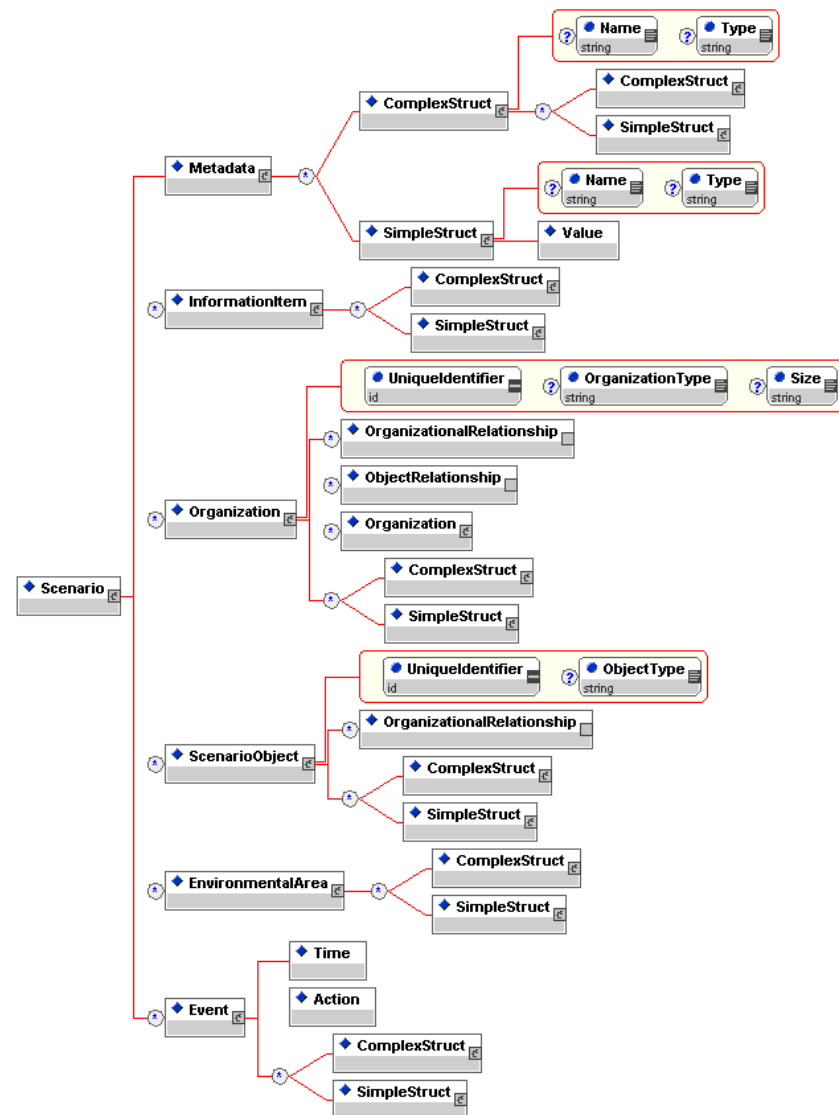
Business Model
A View of Processes

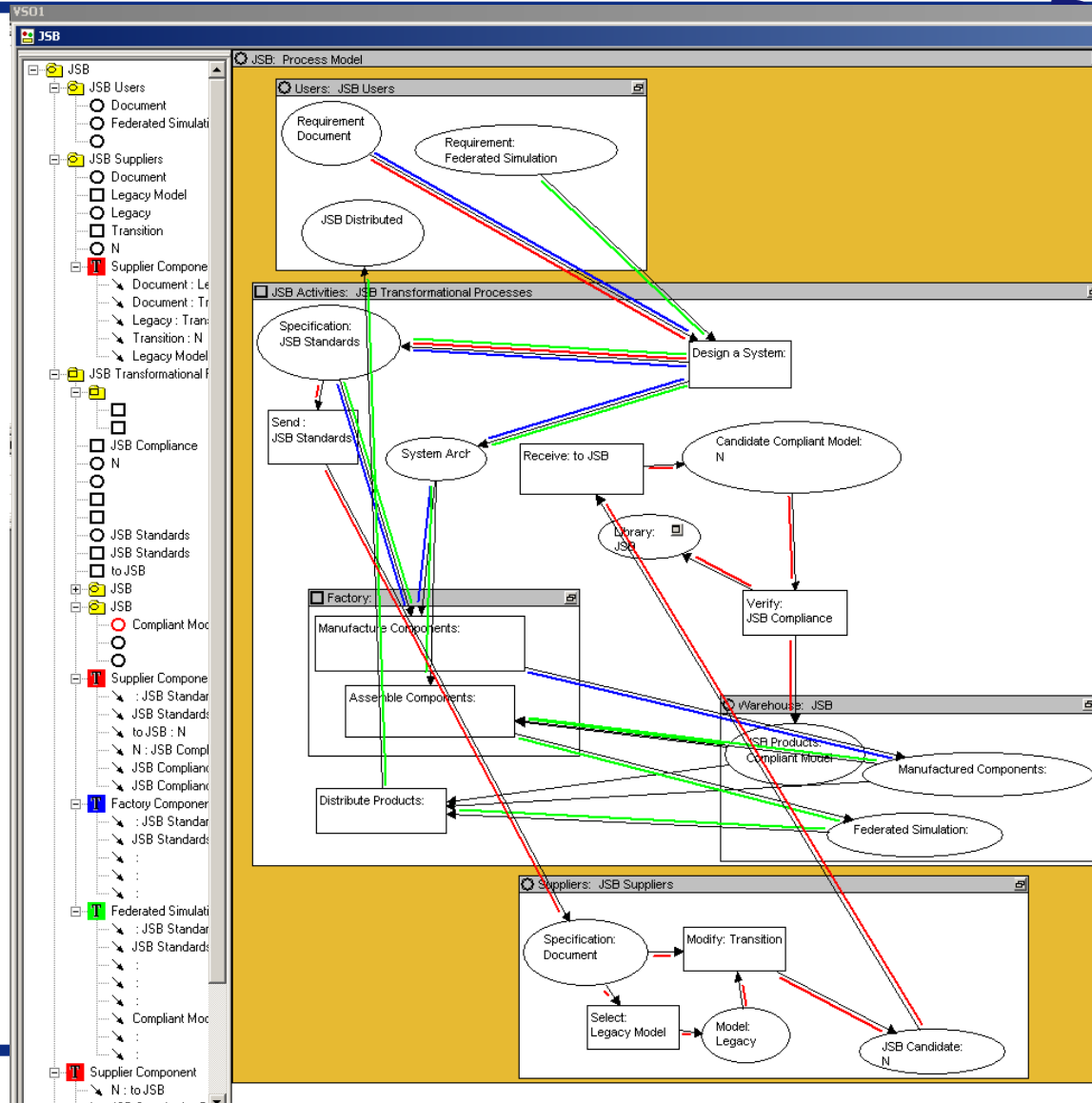U.S. AIR FORCE

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Users

JSB

Legacy